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PREDICTING DRIVERS AND DISTRIBUTIONS OF DEEP-SEA ECOSYSTEMS: A COLD-WATER CORAL CASE STUDY

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ABSTRACT

Little is yet known about species distribution patterns and physical drivers in deep-sea environments due the expensive and time consuming sampling effort. The increasing need to manage and protect vulnerable marine ecosystems, such as cold-water corals, has motivated the use of predictive modelling tools, which allow assessment of potential species or habitat distribution on larger spatial scales and resolution than traditionally accomplished by individual surveys. Advances in acoustic remote sensing, oceanographic modelling and sampling technology now provide high quality datasets, facilitating species distribution modelling with high spatial detail. In this study, we used high resolution data (250 m grid size) from a newly developed hydrodynamic model to explore linkages between key physical drivers and occurrences of the cold-water coral Lophelia pertusa in selected areas of the NE Atlantic (Mohn et al., 2014). Further, these model data were combined with high resolution terrain attributes and video transect derived species distribution data to test the capacity of multi-parameter high-resolution data for improving the predictive skill of species distribution models using Lophelia pertusa as a case study (Rengstorf et al., 2014). The study shows that predictive models incorporating hydrodynamic variables perform significantly better than models based on terrain parameters only. They are a potentially powerful tool to improve our understanding of deep-sea ecosystem functioning and to provide decision support for marine spatial planning and conservation in the deep sea.

Mohn et al., 2014.Linking benthic hydrodynamics and cold water coral occurrences: A high-resolution model study at three cold-water coral provinces in the NE Atlantic. Progress in Oceanography 122, 92-104.

Rengstorf et al., 2014. Predicting the distribution of deep-sea vulnerable marine ecosystems using high-resolution data: Considerations and novel approaches. Deep-Sea Research I, 93, 72 – 82.